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In The
Supreme Court of the United States

COMMONWEALTH OF MASSACHUSETTS, et al.,
Petitioners,
v.
ENVIRONMENTAL PROTECTION AGENCY, et al.,
Respondents.

On Writ Of Certiorari To The United States Court Of Appeals For The District Of Columbia Circuit

BRIEF OF *AMICI CURIAE* NORTH COAST RIVERS ALLIANCE, DESERT PROTECTION SOCIETY, WESTSIDE ASSOCIATION TO SAVE AGRICULTURE, CALIFORNIA SPORTFISHING PROTECTION ALLIANCE, SAVE MEDICINE LAKE COALITION, KLAMATH FOREST ALLIANCE, SAN JOAQUIN AUDUBON SOCIETY AND NORTH CASCADES CONSERVATION COUNCIL IN SUPPORT OF PETITIONERS

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TABLE OF CONTENTS

	Page
INTERESTS OF THE *AMICI CURIAE*	1
SUMMARY OF ARGUMENT	5
ARGUMENT	7
I. GLOBAL WARMING THREATENS SIGNIFICANT HARM TO PUBLIC HEALTH AND WELFARE	7
A. Global Warming Has Substantial Adverse Impacts on Vital Natural Resources and Dependent Economic Sectors	8
1. Fresh Water	8
2. Agriculture and Forestry	9
3. Recreational and Commercial Fishing	12
4. General Economic Impacts	14
B. Global Warming Harms Human Health	15
1. Extreme Temperatures	15
2. Extreme Weather Events	16
3. Infectious Diseases	17
II. GLOBAL WARMING'S SPECIFIC ADVERSE IMPACTS ON PETITIONERS GIVE THEM STANDING TO SUE	18
A. The Harm Is Concrete	18
B. The Harm Is Caused By EPA's Failure to Act	20
C. The Harm Is Redressable	21
D. The Harm Is Within the Zone of Interests Contemplated By the Statute	23

TABLE OF CONTENTS – Continued

Page

III. EPA HAS AUTHORITY UNDER THE CLEAN AIR ACT TO REGULATE CARBON DIOXIDE... 24

IV. EPA'S REFUSAL TO REGULATE CARBON DIOXIDE IS ARBITRARY AND CAPRICIOUS... 26

CONCLUSION..... 29

TABLE OF AUTHORITIES

Page

FEDERAL CASES

Association of Data Processing Organizations v. Camp, 397 U.S. 150 (1970) 23

Bennett v. Spear, 520 U.S. 154 (1997) 23

Burnet v. Chicago Portrait Co., 285 U.S. 1 (1932) 24

Chevron U.S.A., Inc. v. Natural Resources Defense Council, Inc., 467 U.S. 837 (1984) 24

City of Los Angeles v. National Highway Traffic Safety Admin., 912 F.2d 478 (D.C. Cir. 1990) 22

Diamond v. Chakrabarty, 447 U.S. 303 (1980) 25

Ethyl Corp. v. EPA, 541 F.2d 1 (D.C. Cir. 1976) 27

Federal Election Commission v. Akins, 524 U.S. 11 (1998) 19

FEC v. Democratic Senatorial Campaign Committee, 454 U.S. 27 (1981) 24

FDA v. Brown & Williamson, 529 U.S. 120 (2000) 28

Florida Audubon Society v. Bentsen, 94 F.3d 658 (D.C. Cir. 1996) 21

FMC v. Seatrain Lines, Inc., 411 U.S. 726 (1973) 24

Friends of the Earth v. Laidlaw Environmental Services, Inc., 528 U.S. 167 (2000) 20

FTC v. Colgate-Palmolive Co., 380 U.S. 374 (1965) 24

Guardians Ass'n v. Civil Service Com'n of City of New York, 463 U.S. 582 (1983) 25

Lead Industries Ass'n v. EPA, 647 F.2d 1130 (D.C. Cir. 1980) 27

TABLE OF AUTHORITIES – Continued

Page

Lujan v. Defenders of Wildlife, 504 U.S. 555 (1992) 18

Manhattan General Equipment Co. v. Commissioner, 297 U.S. 129 (1936) 25

NLRB v. Brown, 380 U.S. 278 (1965) 24

SEC v. Sloan, 436 U.S. 103 (1978) 24

Sierra Club v. Morton, 405 U.S. 727 (1972) 19

Social Security Board v. Nierotko, 327 U.S. 358 (1946) 24

United States v. Students Challenging Regulatory Agency Procedures (SCRAP), 412 U.S. 669 (1973) 20, 21

Volkswagenwerk v. FMC, 390 U.S. 261 (1968) 24

Webster v. Luther, 163 U.S. 331 (1896) 24

Whitman v. American Trucking Ass'n, Inc., 531 U.S. 457 (2001) 27

Whitmore v. Arkansas, 495 U.S. 149 (1990) 18

FEDERAL STATUTES

42 United States Code

§ 7403(g)(1) 25

§ 7521(a)(1) 26

§ 7602(g) 25

FEDERAL REGISTER

Control of Emissions from New Highway Vehicles and Engines, 68 Fed. Reg. 52,922, 52,928 (Sept. 8, 2003) 28

INTERESTS OF THE *AMICI CURIAE*[1]

Amici are environmental organizations with significant experience in studying, managing and protecting natural and cultivated resources in the states of California and Washington, including mountains, deserts, agricultural lands, forests, rivers, lakes, estuaries and their ecosystems. They are the North Coast Rivers Alliance, Desert Protection Society, Westside Association to Save Agriculture, California Sportfishing Protection Alliance, Save Medicine Lake Coalition, Klamath Forest Alliance, San Joaquin Audubon Society and North Cascades Conservation Council. *Amici* represent neither party in this action, and write solely to offer an environmental perspective on the significant issues of public welfare at stake in this dispute.

Amicus North Coast Rivers Alliance ("NCRA") is an unincorporated association of conservation leaders from throughout the north coast of California. NCRA has actively participated in the review and submission of comments on land and water resource development projects along the north coast of California, and has participated in litigation to enforce compliance by state and federal agencies with state and federal environmental laws. NCRA is particularly concerned regarding the adverse effects of greenhouse gas emissions on river flows and the well being of fish and wildlife dependent on them in northern California.

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[1] All parties have consented to the submission of this brief, and their letters of consent have been filed with the Clerk of this Court. This brief was not written in whole or in part by counsel for a party. No person or entity other than *amici* made any monetary contribution to the preparation or submission of this brief.

Amicus Desert Protection Society ("DPS") is a non-profit California corporation formed in 1993 for the purpose of protecting and preserving the scenic, scientific, historic and recreational resources of the California desert. DPS and its members use and enjoy federal lands throughout the California desert for a variety of outdoor pursuits, including scientific study, recreation, aesthetic enjoyment and agriculture. DPS and its members are particularly concerned regarding the adverse effects of greenhouse gases on climate change in the California desert, particularly the dramatically increasing summer temperatures experienced over the past three decades, and the adverse effects of these increases on the wildlife that inhabit the California desert, particularly endangered species including the Peninsular Big Horn sheep and the Desert tortoise. DPS has engaged in public education to promote awareness of the unique and fragile resources of the California desert, and has participated in state and federal litigation to protect and restore California's unique desert resources.

Amicus Westside Association to Save Agriculture ("WASA") is a non-profit public benefit corporation formed in California in 1984 for the purpose of engaging in public education and advocacy to promote the protection and restoration of agricultural lands and uses in the Russian River Valley of California's north coast. WASA's members make productive and healthy use of their agricultural lands and the natural environmental amenities of the Russian River Valley, and are vitally interested in protecting these resources and uses in the face of climate change due to greenhouse gas emissions. WASA and its members have monitored and submitted comments on land and water management projects throughout the Russian River

basin, and have participated in litigation as necessary to enforce agency compliance with state and federal environmental laws. WASA and its members are particularly concerned regarding the adverse effects of climate change on the Russian River and adjacent groundwater aquifers, including longer droughts and more severe flooding.

Amicus California Sportfishing Protection Alliance ("CSPA") is a non-profit public benefit corporation organized under the laws of California for the purpose of preserving and enhancing California public-trust fishery resources and enforcing the state and federal laws that protect them. CSPA's members use northern California rivers that drain the Sierra Nevada and the Coast Range for sport and commercial fishing, aesthetic enjoyment, nature study, boating and swimming. For decades CSPA and its members have been engaged in extensive public education and advocacy efforts throughout northern California to protect its lake and riverine resources from harmful land and water use management. CSPA and its members are particularly concerned regarding the adverse effects of greenhouse gas emissions on the shrinking Sierra Nevada snowpack and declining summer and fall flows in the rivers of the Sierra Nevada and the California Coast Range.

Amicus Save Medicine Lake Coalition ("SMLC") is an unincorporated association formed in 1999 for the purpose of representing a broad spectrum of environmental organizations, Native Americans, recreationists and residents of the Mount Shasta region who have joined together to protect the extraordinary scenic resources, unique geologic formations, abundant wildlife, pristine air and water quality, sacred Native American cultural resources and outstanding recreational opportunities in the Medicine

Lake Highlands east of Mount Shasta. SMLC and its members use and enjoy these resources and are concerned regarding the adverse effects of greenhouse gas emissions on the shrinking snowpack on Mount Shasta and in the California Cascade Mountains and the resulting declines in summer river flows and increases in river temperatures in the region.

Amicus Klamath Forest Alliance ("KFA") is a non-profit public benefit corporation organized under the laws of California for the purpose of promoting sustainable forest ecosystems and economies in northern California and southwest Oregon. KFA and its members actively participate in governmental decisionmaking processes with respect to lands managed by the United States Forest Service, the Bureau of Land Management and National Park Service in northern California and southwest Oregon. KFA and its members study and enjoy the mountains, forests, lakes and rivers of the region for nature study, fishing, boating, hiking, photography, aesthetic enjoyment and educational, cultural and ceremonial activities. KFA and its members are concerned regarding the adverse effects of greenhouse gas emissions on climate change in the Cascade ranges of northern California and southwest Oregon, particularly with regard to increasing summer temperatures and declining river flows, and the resulting adverse impacts on fish and wildlife.

Amicus San Joaquin Audubon Society ("SJAS") is a non-profit public benefit corporation organized under the laws of California whose members reside primarily in the California Central Valley. Its members use the San Joaquin, Mokelumne and Sacramento rivers and their deltas and the San Francisco Bay-Delta estuary for nature study, recreation and aesthetic enjoyment. SJAS

and its members engage in educational and advocacy activities to promote public concern for and conservation of the endangered ecosystem of the Bay-Delta and its tributary rivers. SJAS and its members are particularly concerned regarding the adverse effects of greenhouse gas emissions on the quality and quantity of water flowing in northern California's rivers, and the adverse impacts of increasing temperatures on the shrinking Sierra snowpack and declining summer and fall flows in Sierra Nevada rivers tributary to the Bay-Delta.

Amicus North Cascades Conservation Council ("NCCC") is a non-profit organization formed in 1957 whose public education campaign inspired Congress to establish the North Cascades National Park and Lake Chelan National Recreational Area in 1968. NCCC and its members actively participate in legislative, administrative and judicial fora to protect and preserve the lands, waters, plants and wildlife of the North Cascades ecosystem. NCCC and its members are vitally interested in protecting the alpine and sub-alpine ecology of the North Cascades mountains, and are particularly concerned regarding the adverse impacts of greenhouse gas emissions on the North Cascades' shrinking glaciers and declining summer and fall river flows and fish and wildlife populations.

SUMMARY OF ARGUMENT

Global warming poses significant, widespread and well documented threats to public health and welfare. Global warming is causing sea levels to rise, glaciers and mountain snowpacks to shrink, summer and fall river

flows to decline, wildfires to increase, hurricanes to intensify, summer heat waves and droughts to become more severe and prolonged, and widespread adverse impacts to agricultural productivity, recreational and commercial fishing, forestry, and human health and safety, particularly among the elderly and infirm.

Although global warming's adverse impacts are widespread, they cause specific harm to petitioners, thus conferring standing to bring this lawsuit. Petitioners have suffered particular, concrete, actual, imminent and redressable harms due to the respondent Environmental Protection Agency Administrator's failure to regulate carbon dioxide emissions that lead to global warming. These harms are well within the zone of interests protected by the Clean Air Act.

EPA has clear statutory authority to regulate carbon dioxide. Sections 103(g) and 302(g) of the Clean Air Act specifically identify "carbon dioxide" as an "air pollutant" over which the EPA Administrator has broad authority to promulgate regulations.

The EPA Administrator's refusal to regulate carbon dioxide emissions based on generalized policy grounds extraneous to the Clean Air Act's structure and language is arbitrary and capricious. Congress directed in section 202(a)(1) of the Clean Air Act that the EPA Administrator "shall by regulation prescribe . . . standards applicable to the emission of any air pollutant from . . . new motor vehicles . . . which in his judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare." Since carbon dioxide emissions directly contribute to global warming, and

global warming "may reasonably be anticipated to endanger public health or welfare," the EPA Administrator must regulate such emissions. His failure to do so is an abuse of discretion, and must be set aside.

ARGUMENT

I. GLOBAL WARMING THREATENS SIGNIFICANT HARM TO PUBLIC HEALTH AND WELFARE.

Global climate change is both a local and a global issue that requires a national remedy. As a result of global warming and associated weather pattern changes, some regions of this country will suffer extreme hurricanes and flooding while others experience extreme heat waves and drought. Sea levels will rise, inundating coastal regions. Glaciers and snowpacks will shrink, and summer and fall river flows will decline in quantity and quality. Overall, the acreage of total arable land and irrigated farmland will diminish. California and other western states are already seeing drastic changes in the environment due to global warming. Summer temperatures are rising, crops are failing, the Sierra Nevada snowpack is dwindling, winter flooding is increasing and summer river flows are declining. The elderly and the infirm are dying in unprecedented heat waves.

These profound and grave changes in environmental health call for informed, prompt and decisive regulatory action. But as with acid rain, problems caused by increased carbon dioxide emissions cannot be solved by states acting and regulating alone. A national approach such as the regulatory structure prescribed in the Clean

Air Act is essential to control excessive carbon dioxide emissions, and to reduce the risks of global warming.

A. Global Warming Has Substantial Adverse Impacts on Vital Natural Resources and Dependent Economic Sectors

1. Fresh Water

Most Western states, including California, Oregon and Washington, depend on mountain glaciers and seasonal mountain snowpack to assure a year-round fresh water supply for domestic and agricultural uses. This supply is now at risk. Global warming has already impacted stream-flows across the West. Each year, the mountain snow in the Sierra Nevada and Cascades is accumulating later and melting earlier, concurrent with a steady rise in average annual temperature.[2] This shortened season results in less overall snowpack accumulation, and less freshwater storage for human consumers. The mountain elevation level at which freezing occurs rises with temperature, meaning that much of the precipitation that once fell as snow will now fall as rain, leading to more frequent and severe flooding.[3]

Since springtime snowmelt has historically accounted for 50 to 80 percent of freshwater flows across the West, changes in the volume and timing of that freshwater

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[2] I.T. Stewart, et al., "Changes Toward Earlier Streamflow Timing Across Western North America," *Journal of Climate* 18:1136-1155 (April 15, 2005).

[3] D.F. Boesch et al., *The Potential Consequences of Climate Variability and Change on Coastal Areas and Marine Resources: Report of the Coastal Areas and Marine Resources Sector Team.* Silver Spring, USGCRP:163 (2000).

infusion have significant impacts on state water management programs. *Id.* This loss of snowpack not only causes landslides, flash floods and lake overflow,[4] but also increases annual variation in water flows in rivers, with negative impacts on agricultural and recreational consumers of that water. Furthermore, higher summer temperatures and lower forest moisture create dry conditions conducive to bark beetle infestations of forests and the genesis and spread of wildfires.

Regional rainfall has dropped by 20 percent in many parts of California since 1900.[5] Some models predict even greater declines in precipitation as average temperatures increase.[6] In combination with decreased snowpack and more variable runoff flows, this drop in rainfall is likely to precipitate a water crisis in California. As water budgets in the West grow ever tighter, global warming will only aggravate the intensity and frequency of future disputes.

2. Agriculture and Forestry

Farming across the United States will be adversely affected by changes in rainfall distribution patterns, higher temperatures, and drought. Contrary to premature predictions by some that increased atmospheric carbon

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[4] United Nations Environmental Programme (UNEP), *Glacial Lake Outburst Flood Monitoring and Early Warning System* (available at http://www.rrcap.unep.org/issues/glof) (2000).

[5] T.R. Karl et al., "Indices of Climate Change for the United States," *Bulletin of the American Meteorological Society*, 77:279-291 (1996).

[6] J.M. Lenihan et al., "Climate Change Effects on Vegetation Distribution, Carbon, and Fire in California," *Ecological Applications* 13(6):1667-1681 (2003).

dioxide will increase agricultural production,[7] the negative impacts of higher temperatures and a destabilized water supply will outweigh any positive fertilization effect. Experimental evidence demonstrates that the cereal grasses (wheat, rice, and corn) producing most of the nation's calories benefit *least* from increases in carbon dioxide.[8] The slight increases in crop yields due to greater concentrations of carbon dioxide in the air are more than offset by higher temperatures and decreases in soil moisture.[9,10] In one empirical study, rice yield was found to decline by ten percent for each one-degree rise in growing-season minimum temperatures.[11] Furthermore, the accelerated growth of some crops due to increased carbon dioxide alone simultaneously *diminishes* the nutritional quality of that crop.[12] Levels of protein decreased by an average of 14 percent across the cereal grains studied when they were exposed to increased levels of carbon

[7] R.M. Adams et al., "A Reassessment of the Economic Effects of Global Climate Change on U.S. Agriculture," *Climatic Change* 30(2):147-167 (1995).

[8] E.A. Ainsworth and S.P. Long, "What Have We Learned from Fifteen Years of Free-Air CO2 Enrichment (FACE)? A Meta-Analytic Review of the Responses of Photosynthesis, Canopy Properties and Plant Production to Rising CO2," *New Phytologist* 165:351-72 (2005).

[9] H. Fountain, "Observatory: Threat to Rice Crops," NEW YORK TIMES, December 12, 2000, F-5.

[10] Intergovernmental Panel on Climate Change, *CLIMATE CHANGE 2001: IMPACTS, ADAPTATION AND VULNERABILITY*, section 5.3 (Cambridge University Press, Cambridge 2001).

[11] S. Peng et al., "Rice Yields Decline with Higher Night Temperature From Global Warming," *Proceedings of the National Academy of Sciences* 101(27):9971-9975 (July 6, 2004).

[12] L.M. Jablonski, X. Wang, and P.S. Curtis, "Plant Reproduction under Elevated CO2 Conditions: A Meta-Analysis of Reports on 79 Crop and Wild Species," *New Phytologist* 156 (2002) 9-26.

dioxide.[13] Concentrations of iron and zinc also dropped under the same conditions.[14] Satellite data show that in terms of sheer biomass, the productivity of plant life in the northern hemisphere did increase from 1982 to 1991.[15] More recent studies, however, found that between 1991 and 2002, widespread droughts due to global warming caused a decrease in summer photosynthesis in much of the northern hemisphere.[16] Alterations in rainfall distribution patterns, as well as more rapid spring snowmelt, are causing increased erosion of farmland, and rising sea levels are causing coastal erosion.[17]

Forests in many regions, including most of the western United States, face an increased risk of forest fires due to global warming. The 10-year average acreage of boreal forest burned in North America rested at around 2.5 million acres per year for decades, but has increased steadily since 1970 to more than 7 million acres annually,

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[13] "More Carbon Dioxide Could Reduce Crop Value," *Environment News Service*, October 3, 2002.

[14] S.P. Seneweera and J.P. Conroy, "Growth, Grain Yield and Quality of Rice (*Oryza sativa L.*) in Response to Elevated CO2 and Phosphorus Nutrition," *Soil Science and Plant Nutrition* 43:1131-1136 (1997).

[15] R.B. Myneni et al., "Increased plant growth in the northern high latitudes from 1981 to 1991," *Nature* 386:698-702 (April 17,1997).

[16] A. Angert et al., "Drier summers cancel out the CO2 uptake enhancement induced by warmer springs,"*Proceedings of the National Academy of Sciences* 102 (31): 10823-10827 (August 2, 2005); S.J. Goetz, et al., "Satellite-observed photosynthetic trends across boreal North America associated with climate and fire disturbance," *Proceedings of the National Academy of Sciences* 102 (38):13521-13525 (September 20, 2005).

[17] K. Zhang, B.C. Douglas and S.P. Leatherman, "Global Warming and Coastal Erosion," *Climatic Change* 64(1-2):41-58 (May 2004).

a 3-fold increase.[18] Warmer temperatures are increasing both the duration and intensity of the wildfire season in the West.[19] Areas burned by wildfires each year in the West will more than double over the next century. *Id.* The most severe effects of global climate change would occur in the Sierra foothills, where the predicted number of potentially catastrophic fires will increase by 143 percent in grassland and 121 percent in chaparral.[20]

3. Recreational and Commercial Fishing

Oceans absorb most of the excess carbon dioxide produced by land animals (including humans), either as dissolved gas, or in the calcium carbonate skeletons of marine animals. It is estimated that the oceans have absorbed around half of all carbon dioxide generated by human activities since 1800.[21] In water, dissolved carbon dioxide becomes a weak carbonic acid, lowering the pH of seawater. *Id.* As the carbon dioxide content of the atmosphere has increased, the acidification of the oceans has harmed many forms of marine life, including several species of commercial fish. *Id.*

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[18] U.S. Global Change Program, *U.S. National Assessment of the Potential Consequences of Climate Variability and Change Educational Resources Regional Paper: Alaska* (updated 12 October, 2003) (available at http://www.usgcrp.gov/usgcrp/nacc/education/alaska/ak-edu-5.htm)

[19] S.W. Running, "Is Global Warming Causing More, Larger Wildfires?" *Science* 313:927-928 (August 18, 2006).

[20] M.S. Torn, E. Mills, et al., *Will Climate Change Spark More Wildfire Damage?* Lawrence Berkeley National Laboratory LBNL Report No. 42592 (1998).

[21] C.L. Sabine et al., "The Oceanic Sink for Anthropogenic CO2," *Science* (July 16, 2004) 305 (5682):367-371.

Other warming-induced changes have serious ramifications for fisheries and ocean life. For instance, temperature anomalies in the North Atlantic have already degraded the entire ocean food chain in that region, starting from the bottom.[22] When ocean temperatures, currents, and acidity change, the amount of planktonic food available for fish larvae (and consequently the size of fish populations) declines.[23] Migration patterns and spatial distributions of large fish, such as bluefin tuna, have been altered through climate-induced changes in prey abundance.[24] Overall, global fish production is expected to fall substantially as a result of rising ocean temperatures and acidity.[25] Changes like this have already appeared in the northeast Pacific ecosystem.[26]

The growing fluctuations in river water temperatures can have significant negative impacts on the health of their fish populations.[27] Warmer water temperatures due

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[22] J.-M. Fromentin & B. Planque, "*Calanus* and environment in the eastern North Atlantic. 2. Influence of the North Atlantic Oscillation on *C. finmarchius* and *C. helgolandicus*. *Marine Ecology Prog. Service* 134:111-118 (1996).

[23] D.H. Cushing, *POPULATION PRODUCTION AND REGULATION IN THE SEA: A FISHERIES PERSPECTIVE* (Cambridge Univ. Press, Cambridge, 1995).

[24] J.J. Polovina, "Decadal variation in the trans-Pacific migration of northern bluefin tuna (*Thunnus thynnus*) coherent with climate-induced change in prey abundance." *Fish Oceanography* 5:114-119 (1996).

[26] G.R. Walther et al., "Ecological Responses to Recent Climate Change," *Nature* 416:389-395 (March 28, 2002).

[26] J. A. McGowan, D. R. Cayan & L. M. Dorman, "Climate-ocean variability and ecosystem response in the Northeast Pacific," *Science* 281:210-217 (1998).

[27] D. Caissie, "The Thermal Regime of Rivers: A Review," *Freshwater Biology*, 51(8):1389-1406 (August 2006).

to global warming reduce salmon size and numbers.[28] These declines harm both the commercial and sport fishing industries. In 1996, an estimated 9 million trout anglers in the United States spent some 94 million person-days fishing, generating up to $14 billion in economic value.[29] An analysis of global warming impacts on trout habitat predicts that up to 42 percent of existing fish habitat in the West could be lost by 2090. *Id.*

The fishing industry also faces losses as coastal wetlands, which serve as habitat or breeding grounds for many fish species, are eliminated due to rising sea levels.[30] A 50 percent loss in wetland area or productivity, expected by the end of this century, is estimated to lead to a 15 to 20 percent loss in estuarine-dependent fish harvests. *Id.* About 68 percent of all commercially harvested fish species in the United States depend on wetlands for habitat, food or protection. *Id.* This translates into a total catch reduction of at least nine percent due solely to sea level rise. *Id.*

4. General Economic Impacts

Financial institutions are becoming aware of the potential economic impacts of global warming and are

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[28] D.W. Welch, Y. Ishida, and K. Nagasawa, "Thermal Limits and Ocean Migrations of Sockeye Salmon (*Oncorhynchus nerka*): Long-term Consequences of Global Warming," *Canadian Journal of Fisheries and Aquatic Science* 55:937-948 (1998).

[29] K. O'Neal, (Defenders of Wildlife). EFFECTS OF GLOBAL WARMING ON TROUT AND SALMON IN U.S. STREAMS (2002).

[30] S. Fankhauser, *Global Warming Damage Costs: Some Monetary Estimates*. Centre for Social and Economic Research on the Global Environment (CSERGE) GEC Working Paper 92-29.

taking steps to mitigate the real risks. The world's two largest insurance companies, Munich Re and Swiss Re, warned in a 2002 study (UNEP summary) that "the increasing frequency of severe climatic events, coupled with social trends" could cost almost $150 billion per year in the next decade. Each 1 percent increase in annual precipitation due to global warming has been estimated to increase economic losses by as much as 2.8 percent.[31] These losses will, through increased costs related to insurance and disaster relief, burden insured businesses and homeowners, taxpayers, and industry alike.

B. Global Warming Harms Human Health

1. Extreme Temperatures

The EPA estimates that a warming of three degrees Fahrenheit would almost double the annual heat-related deaths in Los Angeles, from 70 (in 1997) to 125.[32] Even a small increase in global temperature can cause relatively large increases in the number of extremely hot days, increasing the likelihood of "killer" heat waves.[33] These increases are associated with the exacerbation of preexisting cardiovascular and respiratory disorders, disproportionately affecting the elderly, very young, poor, and

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[31] O. Choi and A. Fisher, "The Impacts of Socioeconomic Development and Climate Change on Severe Weather Catastrophe Losses: Mid-Atlantic Region (MAR) and the U.S." *Climate Change*, 58:149 (2003).

[32] J. Patz et al., *Climate Change and Health in California: A Pier Research Roadmap*, prepared for California Energy Commission (CEC-500-2005-093) (May 2005) (available at http://www.energy.ca.gov/pier/final_project_reports/CEC-500-2005-093.html).

[33] T.R. Karl and R.W. Knight, "The 1995 Chicago heat wave: How likely is a recurrence?" *Bulletin of the American Meteorological Society* 78:1107-1119 (1997).

ill.[34] High temperatures in urban areas also encourage formation of ground-level ozone, a pollutant that causes lung damage. *Id.*

California recently experienced one of the deadliest heat waves on record, resulting in well over one hundred deaths and temperatures over 120 degrees in many towns across the state.[35] Many of the deaths were due to the fact that, unlike prior heat waves, the 2006 heat wave saw extremely high night-time temperatures as well as day-time highs, so those affected were unable to recover at night.[36]

2. Extreme Weather Events

The World Meteorological Organization has documented a link between global warming and increasing extreme weather events, as have independent researchers, who write that "the increasing . . . number of category 4 and 5 hurricanes . . . is directly linked to" increasing temperatures.[37] Hurricane modeling has yielded similar predictions. Simulated hurricanes modeled under warmer, high-carbon-dioxide conditions are more intense, and a greater number of them evolve into powerful Category 5

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[34] A.J. McMichael, *Human population health*. INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE THIRD ASSESSMENT REPORT: CLIMATE CHANGE 2001 (Cambridge University Press, Cambridge, UK).

[35] J. Steinhauer, "In California, Heat is Blamed for 100 Deaths," NEW YORK TIMES, July 28, 2006.

[36] H. Becerra, "High Nighttime Temperatures Set Records Too," LOS ANGELES TIMES, July 25, 2006.

[37] C. Hoyos et al., "Deconvolution of the Factors Contributing to the Increase in Global Hurricane Intensity," *Science* (16 March 2006) 11235601 (DOI: 10.1126).

storms.[38] Many people have already died as a result of increased hurricane activity in the Gulf region, and it is expected that deadly hurricane activity will only increase on average. Although the West Coast does not suffer hurricanes, climate change-induced increases in precipitation have caused flooding and landslides, particularly in California.[39]

3. Infectious Diseases

Global warming increases the spread of infectious diseases. One of the largest known outbreaks of *Vibrio parahaemolyticus* gastroenteritis has been attributed to generally rising ocean temperature, when infected oysters were harvested in Prince William Sound, Alaska in 2005. Global warming is likely to extend the range of vectors (e.g., mosquitoes) conveying infectious diseases such as malaria. A warmer environment boosts the reproduction rate of mosquitoes and the number of times they eat, prolongs their breeding season, and shortens the maturation period for the microbes they disperse.[40]

Rising temperatures and drought conditions are shifting the range of tropical and mosquito-borne diseases

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[38] T.R. Knutson, "Impact of CO2-Induced Warming on Simulated Hurricane Intensity and Precipitation: Sensitivity to the Choice of Climate Model and Convective Parameterization," *Journal of Climate* 17(18):3477-3495 (Sep. 15, 2004).

[39] D.F. Boesch et al., *The Potential Consequences of Climate Variability and Change on Coastal Areas and Marine Resources: Report of the Coastal Areas and Marine Resources Sector Team.* Silver Spring, USGCRP:163 (2000).

[40] P.R. Epstein, "Climate Change and Human Health," *New England Journal of Medicine* 353(14):1433-1436 (October 6, 2005).

northward and westward, including West Nile virus, western equine encephalitis, and St. Louis encephalitis.[41] Lyme disease and hantavirus are also spread by warmer temperatures and weather disturbances. *Id.*

II. GLOBAL WARMING'S SPECIFIC ADVERSE IMPACTS ON PETITIONERS GIVE THEM STANDING TO SUE.

The generalized effects of global warming have specific adverse impacts on petitioners, conferring standing to bring this action. Petitioners, a collection of states, municipalities, and environmental organizations, have suffered particular, concrete, actual, imminent, and redressable harms due to EPA's failure to regulate carbon dioxide emissions that lead to global warming. These harms fall within the zone of interests contemplated by the Clean Air Act, and petitioners thus have standing to sue.

A. The Harm Is Concrete.

Petitioners have suffered a concrete injury in fact, as documented by their declarations submitted below. Many of these injuries are "concrete and particularized,"[42] such as the deaths of hundreds due to extreme heat events, and others are "imminent"[43] threats, such as the future loss of coastal property in the State of Massachusetts. Some are "aesthetic, conservational or recreational" harms such as

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[41] P.R. Epstein, "West Nile Virus and the Climate," *Journal of Urban Health* 78(2):367-71 (June 2001).

[42] *Lujan v. Defenders of Wildlife*, 504 U.S. 555, 560-61 (1992).

[43] *Whitmore v. Arkansas*, 495 U.S. 149, 155 (1990).

those held to be injuries in fact in *Sierra Club v. Morton*. 405 U.S. 727 (1972).

As shown above, the number of people who are suffering or will suffer some particular and concrete injury due to global warming is substantial. But not everyone will be similarly injured by global warming, as some may be located in less vulnerable areas or possess the financial means to insulate themselves against its effects. Controlling air pollutants that cause global warming is thus not merely a matter of diffuse public interest that affects all or most people in roughly the same way. Nor is it the type of "widely shared grievance" for which this Court has suggested that "the political process, rather than the judicial process, may provide the more appropriate remedy."[44] Because certain vulnerable segments of the population suffer a disproportionate share of the harm inflicted by global warming, and others may remain unscathed, the political process is unlikely to adequately address these injuries.

There is now overwhelming evidence that global warming causes widespread harm to millions of Americans, from rising sea levels, increasing heat waves and associated droughts, stronger hurricanes and other storms, greater flooding and erosion, more wildfires, erratic precipitation and resulting crop losses. Because of this mounting scientific evidence of economic harm, "the *risk* of global warming is large enough to have real economic consequences, certainly in the view of the insurance

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[44] *Federal Election Commission v. Akins*, 524 U.S. 11, 23 (1998). As the Court went on to note, even a widely shared interest, "where sufficiently concrete, may count as an 'injury in fact.'" *Id.* at 24.

industry."[45] As Professor Farber has noted, insurance companies have already acted in response to global warming by raising their rates for coverage of damage caused by catastrophic weather events, and "[i]t would be silly to say that a rise in insurance rates or the unavailability of insurance did not constitute injuries in fact." *Id.* at 1123. This accords with this Court's holding in *Friends of the Earth v. Laidlaw Environmental Services, Inc.*, 528 U.S. 167, 181 (2000) that a change in behavior due to "reasonable concerns about the effects of those discharges, [which] directly affected those affiants' recreational, aesthetic, and economic interests" sufficed to support a grant of standing to petitioners in that case. Likewise here, reasonable concerns about the impacts of greenhouse gas emissions have already directly affected petitioners' economic interests and are likely to do so in the future.

As this Court held in *United States v. Students Challenging Regulatory Agency Procedures* (*SCRAP*), "to deny standing to persons who are in fact injured simply because many others are also injured, would mean that the most injurious and widespread . . . actions could be questioned by nobody." 412 U.S. 669, 688 (1973). Here, many people are injured by the widespread impacts of global warming, but petitioners' injuries are nonetheless concrete, and specific to petitioners' unique circumstances.

B. The Harm Is Caused By EPA's Failure to Act.

The evidence of harm due to global warming has only grown stronger with the passage of time. The harms

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[45] Daniel A. Farber, *Uncertainty as a Basis for Standing*, 33 Hofstra L.R. 1123, 1129 (2005).

suffered by petitioners are clearly caused by greenhouse gas emissions.[46] The link is far stronger than the "attenuated line of causation" found sufficient to establish standing in *U.S. v. SCRAP*, wherein an increased railroad freight rate would lead to an increase in the use of non-recyclable goods, eventually leading through a convoluted chain of events to an increase in litter in Washington area national parks. 412 U.S. at 688. Here, thousands of scientific studies have demonstrated the strong link between carbon dioxide emissions, global warming, and the heat waves, coastal flooding, extreme weather and other adverse impacts of which petitioners have complained.

The relevant test in cases like this one is a showing that some "particularized environmental interest of [petitioners] will suffer demonstrably increased risk, [and that the challenged agency action] is substantially likely to cause that demonstrable increase in risk to their particularized interest."[47] Here, there is a scientifically based causal link between motor vehicle emissions of carbon dioxide and the climate change that has injured petitioners. Oreskes, *supra*, note 46. EPA's failure to regulate these emissions has delayed the reductions in greenhouse gas emissions that are necessary to prevent imminent harms to petitioners from occurring.

C. The Harm Is Redressable.

The injury in this case is redressable because judicial relief will direct the EPA Administrator to regulate carbon

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[46] N. Oreskes, "The Scientific Consensus on Climate Change," *Science* 306:1686 (2004).

[47] *Florida Audubon Society v. Bentsen*, 94 F.3d 658, 665 (D.C. Cir. 1996).

dioxide emissions from motor vehicles. Limitations on carbon dioxide emissions from motor vehicles, in turn, will reduce atmospheric carbon dioxide and resulting heating of the atmosphere below what it would have been otherwise. Lowered atmospheric carbon dioxide, and thus a lessened increase in average global high temperatures, will in turn lead to fewer of the injuries described above. Motor vehicles are responsible for a significant percentage of carbon dioxide emissions in the United States. In the U.S. in 2004, 33 percent of total carbon-dioxide emissions were due to transportation uses.[48] Eighty-two percent of those emissions were due to the consumption of motor gasoline and diesel fuel (i.e., used by motor vehicles). *Id.* Thus, twenty-seven percent of the carbon dioxide emitted within the United States each year would be subject to regulation by the EPA Administrator – a significant fraction.

Even if it is difficult to evaluate the marginal impact of regulating motor vehicle carbon dioxide emissions on global warming as a whole, this difficulty does not preclude petitioners from suing to force the EPA Administrator to perform his duty. Where "the relevant harms are probabilistic and systemic, with widespread impact, courts must be especially careful not to manipulate the causation requirements of standing so as to prevent the anticipated regulatory beneficiaries from gaining access to court."[49] The ultimate test of redressability here is not whether

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[48] United States Energy Information Administration, *Emissions of Greenhouse Gases in the United States 2004*, DOE/EIA-0573 (2004), released December 2005, at 22.

[49] *City of Los Angeles v. National Highway Traffic Safety Admin.*, 912 F.2d 478, 495 n. 5 (D.C. Cir. 1990).

global warming will be stopped as a result, but whether the Court will be able to correct the EPA Administrator's failure to regulate an air pollutant that causes global warming.

Reducing global warming through such regulation is eminently practicable. Limiting motor vehicle emissions of carbon dioxide would be a relatively painless way of mitigating global warming and its harmful effects on petitioners and *amici*. Motor vehicle emissions can be reduced through a combination of vehicle-targeted, fuel-targeted and transportation-management measures.[50] Vehicle-targeted measures include emission standards as well as inspection and maintenance programs. *Id.* at 38. Fuel-targeted measures include alterations in gasoline formulation and alternative fuel promotion. *Id.* at 40. Transportation and traffic management measures complement the previous measures and can include congestion charges, vehicle access restrictions, and promotion of public transit programs. *Id.* at 41-42. Any and all of these regulatory measures could have a significant impact on future global warming.

D. The Harm Is Within the Zone of Interests Contemplated By the Statute.

Petitioners' suit falls within the "zone of interests" protected by the Clean Air Act.[51] As discussed below, the

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[50] D.M. Elsom, "Air Quality Management – Highlighting Good Practice," *Clean Air and Environmental Quality* 38(1) (February 2004): 36-44.

[51] *See Bennett v. Spear*, 520 U.S. 154, 162-163 (1997); *Association of Data Processing Organizations v. Camp*, 397 U.S. 150, 153-154 (1970).

Clean Air Act *explicitly* cites "climate" as one of the relevant factors to be considered when regulating on behalf of the public welfare. The more specific harms suffered by petitioners as a result of climate change fall *a fortiori* under the umbrella of public welfare.

III. EPA HAS AUTHORITY UNDER THE CLEAN AIR ACT TO REGULATE CARBON DIOXIDE.

This case involves the important, yet straightforward task of interpreting the words of the Clean Air Act ("CAA"). Under bedrock judicial principles, essential to our democratic form of representative governance, the Courts must give effect to the plain meaning of the statutes adopted by Congress.[52] As this Court has stated, "[i]f a court, employing traditional tools of statutory construction, ascertains that Congress had an intention on the precise question at issue, that intention is the law and must be given effect." *Id.*

EPA contends, in defending its decision, that carbon dioxide is not a pollutant under the terms of the CAA. EPA's interpretation, however, contravenes the "clear congressional intent" evidenced in the words of the CAA and therefore warrants this Court's rejection.[53] Section

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[52] *Chevron U.S.A., Inc. v. Natural Resources Defense Council, Inc.*, 467 U.S. 837, 843, fn.9 (1984).

[53] *Id.*, citing *FEC v. Democratic Senatorial Campaign Committee*, 454 U.S. 27, 32 (1981); *SEC v. Sloan*, 436 U.S. 103, 117-118 (1978); *FMC v. Seatrain Lines, Inc.*, 411 U.S. 726, 745-746 (1973); *Volkswagenwerk v. FMC*, 390 U.S. 261, 272 (1968); *NLRB v. Brown*, 380 U.S. 278, 291 (1965); *FTC v. Colgate-Palmolive Co.*, 380 U.S. 374, 385 (1965); *Social Security Board v. Nierotko*, 327 U.S. 358, 369 (1946); *Burnet v. Chicago Portrait Co.*, 285 U.S. 1, 16 (1932); *Webster v. Luther*, 163 U.S. 331, 342 (1896).

302(g) of the Clean Air Act defines an "air pollutant" extremely broadly as:

> [A]ny air pollution agent or combination of such agents, including any physical, chemical, biological, radioactive . . . substance or matter which is emitted into or otherwise enters the ambient air. Such term includes any precursors to the formation of any air pollutant. . . . [42 U.S.C. § 7602(g).]

The CAA's broad language demonstrates Congress' intention to grant the EPA far-reaching authority to regulate air pollution.[54]

In addition, and perhaps even more convincingly, Congress explicitly listed carbon dioxide as a air pollutant in section 103(g), which calls for a research program to find ways to prevent or reduce "multiple *air pollutants*, including sulfur oxides, nitrogen oxides, heavy metals, PM-10 (particulate matter), carbon monoxide, and *carbon dioxide*."[55] Because Congress specifically defined carbon dioxide as a pollutant in the CAA, EPA's contrary determination that it is not a pollutant is demonstrably erroneous and must be overturned. According to this Court, "[a] regulation which does not [carry into effect the will of Congress as expressed by the statute], but operates to create a rule out of harmony with the statute, is a mere nullity." *Guardians Ass'n v. Civil Service Com'n of City of New York*, 463 U.S. 582, 615 (1983), citing *Manhattan*

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[54] *Diamond v. Chakrabarty*, 447 U.S. 303, 308 (1980) ("In choosing such expansive terms . . . modified by the comprehensive 'any,' Congress plainly contemplated that the [statutory provision] would be given wide scope.").

[55] 42 U.S.C. § 7403(g)(1) (emphasis added).

General Equipment Co. v. Commissioner, 297 U.S. 129, 134 (1936).

IV. EPA'S REFUSAL TO REGULATE CARBON DIOXIDE IS ARBITRARY AND CAPRICIOUS.

EPA's refusal to regulate carbon dioxide was based on policy considerations which lie outside of the Administrator's discretionary purview under the Clean Air Act. As such, EPA's decision ignored Congress' clear directive, was arbitrary and capricious, and therefore must be set aside. In section 202(a)(1), Congress instructed, as follows:

> The Administrator *shall* by regulation prescribe (and from time to time revise) in accordance with the provisions of this section, standards applicable to the *emission of any air pollutant* from any class or classes of new motor vehicles or new motor vehicle engines, which in his judgment cause, or contribute to, air pollution which *may reasonably be anticipated to endanger public health or welfare*.[56]

By including the words "in his judgment," Congress did not invest the EPA Administrator with unlimited discretion to consider any factors he chooses in making a determination under section 202(a)(1). To the contrary, Congress sharply limited the Administrator's discretion by requiring him to consider, specifically and exclusively, whether the pollutant "may reasonably be anticipated to endanger public health or welfare." *Id.*

Contrary to Congress' mandate, the EPA Administrator never determined whether carbon dioxide "may reasonably

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[56] 42 U.S.C.A. § 7521(a)(1) (emphasis added).

be anticipated to endanger public health or welfare." Had he followed the CAA's clear direction, he would have weighed the evidence in favor of and against the possibility that excess carbon dioxide may endanger public health and welfare. Instead, however, he based his refusal to regulate on clearly extraneous considerations such as "foreign policy issues" that completely sidestepped the one question that is germane to the issue at hand: whether increasing amounts of carbon dioxide "may reasonably be anticipated to endanger public health or welfare."[57] The Administrator ignored this fundamental question despite overwhelming scientific evidence demonstrating global warming's disastrous impacts.

The Administrator's failure to address this pivotal issue is an abuse of discretion. As has been stated by the D.C. Circuit Court, the Clean Air Act is "precautionary in nature and does not require proof of actual harm before regulation is appropriate." *Ethyl Corp. v. EPA*, 541 F.2d 1, 17 (D.C. Cir. 1976). Moreover, "requiring EPA to wait until it can conclusively demonstrate that a particular effect is adverse to health before it acts is inconsistent with both the Act's precautionary and preventive orientation and the nature of the Administrator's statutory *responsibilities*."[58] Here, where the causal connection between carbon dioxide and climate change is virtually certain, the EPA has no excuse not to regulate.

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[57] See *Whitman v. American Trucking Ass'n, Inc.*, 531 U.S. 457, 486 (2001). Construing a similar section of the CAA directing the EPA Administrator to set standards for pollutants which in his "judgment" are "requisite to protect the public health," the Court held that "[t]he EPA may not consider implementation costs" in setting such standards, as such costs were extraneous to the criterion selected by Congress.

[58] *Lead Industries Ass'n v. EPA*, 647 F.2d 1130, 1155 (D.C. Cir. 1980), emphasis added.

The EPA Administrator contends that *FDA v. Brown & Williamson*, 529 U.S. 120 (2000), forecloses regulation "in areas raising unusually significant economic and political issues when Congress has specifically addressed those areas in other statutes."[59] His conclusion that it therefore cannot regulate greenhouse gases is unpersuasive. In *Brown & Williamson*, this Court declined to extend the FDA's regulatory authority because in that case, if the FDA had followed the regulation at issue to the letter, it would have had no choice but to *ban* tobacco products outright, a step that would have had drastic consequences on the national economy. *Brown & Williamson*, 529 U.S. at 160-161. Here, a plain reading of the Clean Air Act hardly mandates the *banning* of motor vehicles, fossil fuel use, or any other analogous drastic measure. Rather, it simply requires that the EPA set emissions criteria for carbon dioxide, a measure that has been applied to other extremely common air pollutants such as sulfur dioxide and nitrous oxides without catastrophic effects on the national economy.

The EPA Administrator's responsibilities under the CAA include protecting the public's health and welfare. His decision, based on impermissible and extraneous factors, not to regulate carbon dioxide abrogates that duty and must be set aside.

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[59] Control of Emissions from New Highway Vehicles and Engines, 68 Fed. Reg. at 52,925.

CONCLUSION

The judgment of the Court of Appeals should be vacated and the case remanded for further consideration.

Respectfully submitted,

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